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Prepared for

SEKISUI HOUSE AUSTRALIA PTY LIMITED

Traffic Impact Assessment Report

Planning Proposal
Sanctuary, 14-16 Hill Road, Wentworth Point

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Revision History

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1 Introduction

1.1 Background

Ason Group has been commissioned by Sekisui House Australia Pty Ltd to prepare a Transport Assessment (TA) report for a Planning Proposal for the subject site of 14-16 Hill Road, Wentworth Point, referred to as the Sanctuary (the Site). The Site is located within the Local Government Area of City of Parramatta; however, the area was previously part of the former Auburn Council LGA. **Figure 1** provides a location and site plan of the Sanctuary within the context of the surrounding area and the wider Wentworth Point peninsula.

The Site was previously referred to as the Western site of the Wentworth Point Urban Activation Precinct (UAP). As part of the UAP process commenced by Urban Growth in 2013, amendments to the planning controls within the Auburn Local Environmental Plan (LEP) 2010 that apply to the Site were made, facilitating 188,800m^2 of GFA (Gross Floor Area) for high-density residential development in a range of building forms comprising low scale buildings of 5-7 storeys in height, and also 5 x 25-storey towers.

The objective of this Planning Proposal is to amend the LEP to reflect a revised Master Plan for the Site that provides for 228,800m^2 of GFA redistributed across the Site via an alternative street layout as well as an alternative arrangement of building locations, height and open space (the Proposal). A key component of the revised Master Plan is a significant increase in the publicly accessible open space which is a direct public benefit. Furthermore, following comprehensive discussions and design workshops with Transport for NSW (TfNSW), the Site has been configured so that it 'protects' a corridor for Stage 2 of the Parramatta Light Rail project. The Planning Proposal also seeks to allow for the inclusion of some non-residential uses within the Site.

1.2 Planning Context

1.2.1 Wentworth Point Urban Activation Period

The UAP process for the Western (the Sanctuary) and Eastern sites sought to achieve the following across the Wentworth UAP:

- An R4 High Density zoning to provide for residential buildings with a Floor Space Ratio (FSR) of 2.6:1 and heights up from 5 to 25 storeys,
- A new 3.9-hectare peninsula park along with three new pocket parks,
- Foreshore cycling and walking paths at least 20 metres wide,

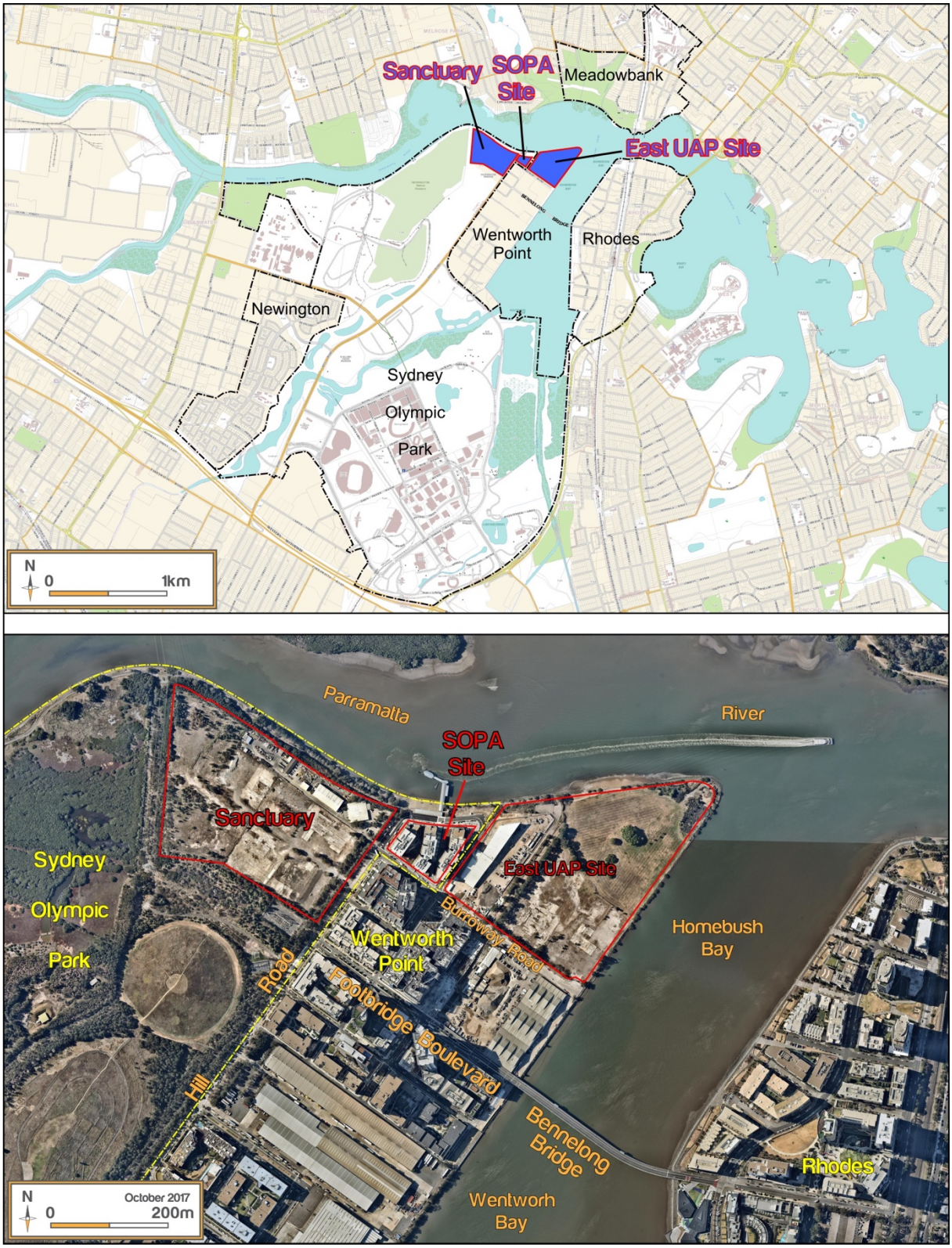


Figure 1 - Site and Location Plan

- An 18-classroom school with playing fields by 2017,
- New maritime uses adjacent to Homebush Bay for rowing/kayaking facility, dry boat storage, and
- Supporting retail and businesses.

As a result of the process, the following 2 outcomes were achieved:

1. Amendments to the LEP were gazetted on 04 July 2014 comprising zone, height and FSR changes for the UAP,
2. The adoption of the Wentworth Point Precinct Development Control Plan 2014 (WPP DCP) on 7 August 2014.

Regarding the Western UAP / the Sanctuary site, the gazettal of the LEP amendments effectively approved controls that permit the development of 188,800m^2 of high-density residential GFA.

The UAP proposal was supported by a traffic study undertaken by Traffix, the results of which were presented in the report titled *Traffic Impact Assessment, Wentworth Point, Urban Activation Precinct*, dated 15 July 2013 (the 2013 Traffix TIA). The following summarises the key findings of the 2013 Traffix TIA.

Traffic

The 2013 Traffix TIA study adopted a peak hour trip rate of 0.35 trips per unit to undertake the traffic analysis for the UAP proposal. This trip rate was based on available trip rate data and guidance at the time, from the Roads & Maritime Services (RMS) *Guide to Traffic Generating Developments*, 2002 (the RMS Guide). Application of this rate to the anticipated (at that stage) 2,300 units within the UAP indicated the UAP would generate 805 residential peak hour trips, consisting of approximately:

- 602 peak hour trips for the Western UAP site (the Sanctuary), and
- 203 peak hour trips for the Eastern UAP site.

In summary, the 2013 Traffix TIA that supported the approved UAP assumed that the 188,800m^2 of high-density residential GFA would generate 602 peak hour trips on the local and wider road network.

Parking

The 2013 Traffix TIA study proposed the following minimum parking rates for residential uses:

- Studio 1.0 space / unit
- 1-bedroom 1.0 space / unit

- 2-bedroom 1.1 spaces / unit
- 3-bedroom 2.0 spaces / unit
- Visitors 0.1 spaces / unit

These rates were subsequently adopted by the WPP DCP.

Access

The primary access intersection to the Site would be provided via a new signalised crossroads intersection at the existing intersection of Hill Road with Burroway Road, with the western approach providing the primary access to the Site. Secondary access to the Site was also provided to the south of the proposed signalised intersection with a further connection to Hill Road, as can be seen on **Figure 2**, which presents the WPP DCP adopted street network for the Site.

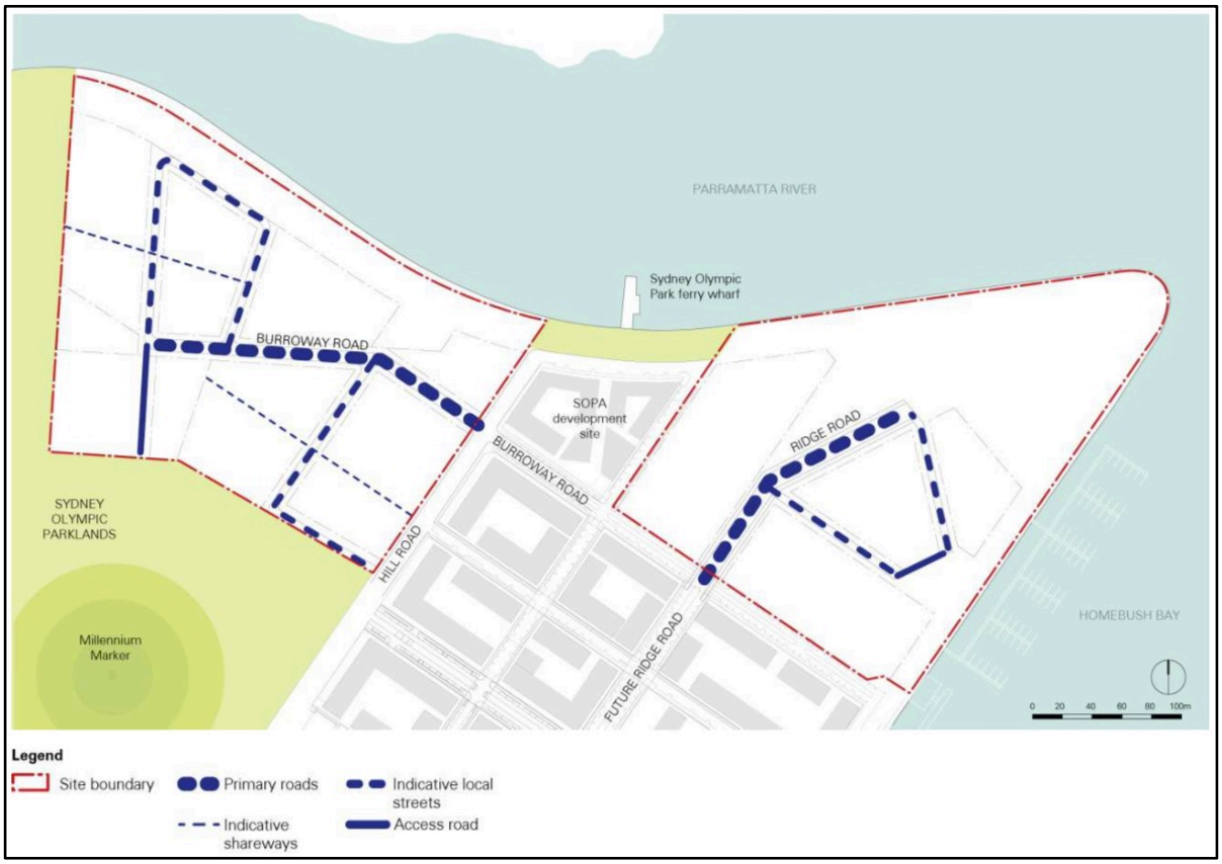


Figure 2 – WPP DCP Adopted Street Network

It is noteworthy that SIDRA Intersection performance testing of the proposed access arrangement took the conservative view of assuming all 602 peak hour trips to/from the Western UAP site would arrive/depart via the proposed primary access and the new signalised intersection. By adopting this

approach, the analysis ensured that satisfactory access to the Site could be provided via the primary access, without any reliance on the secondary southern access. Accordingly, this provided a level of flexibility as to what form the southern access could take at subsequent detailed design phases.

1.2.2 Development Applications DA 274/2014 and DA 41/2015

DA 274/2014 for the subdivision of 14-16 Hill Road into 8 allotments was approved by Auburn City Council on 27 November 2015, and the Stage 1 DA 41/2015 for demolition of existing buildings, remediation of roads and open space areas, tree removal, bulk earthworks, construction of roads, sea wall and public domain works and GFA distribution was approved by Auburn City Council on 17 February 2016.

Figure 3 presents the approved infrastructure site layout and GFA allocation, which effectively presents the approved distribution of the permitted 188,800m^2 of residential GFA across the Site.

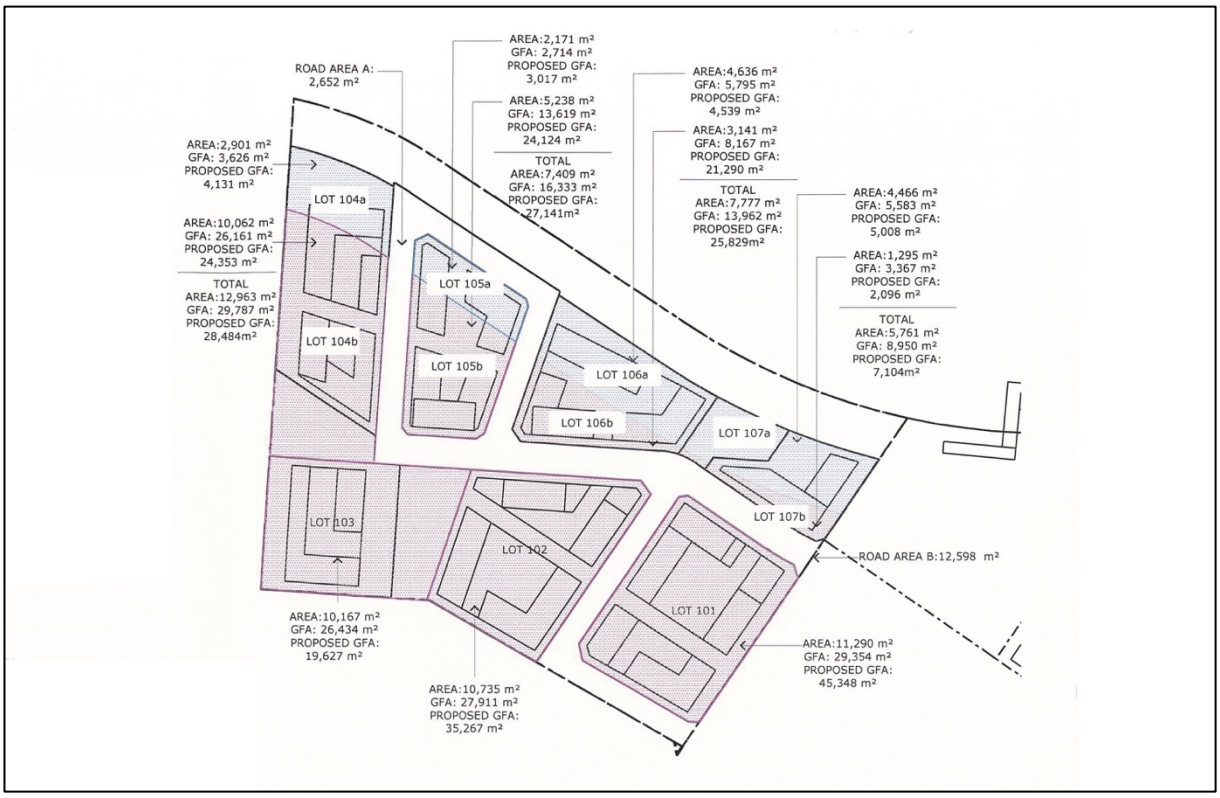


Figure 3 – Approved Infrastructure Site Layout and GFA Allocation

Both development applications were supported by a traffic study undertaken by Traffix, the results of which were presented in the Traffic Impact Statement (TIS) titled *Proposed Signalisation of Hill Road & Burroway Road Intersection, Wentworth Point Development Application*, dated 14 July 2014 (the 2014 Traffix TIS). The following summarises the key findings of the 2014 Traffix TIS.

Traffic

Firstly, the 2013 Traffix TIA assessed the local and wider road network and – with regard to the Site – assessed the cumulative traffic impacts that 602 peak hour trips associated with the Western UAP site would have at key intersections. However, the 2014 Traffix TIS study focussed on the primary access, the proposed signalised crossroads intersection of Hill Road with Burroway Road.

Traffix coordinated with civil engineers Brown Consulting to develop a detailed design of the proposed signalised intersection. **Figure 4** presents the SIDRA Intersection indicative layout representation of the intersection design, extracted from the 2014 Traffix TIS.

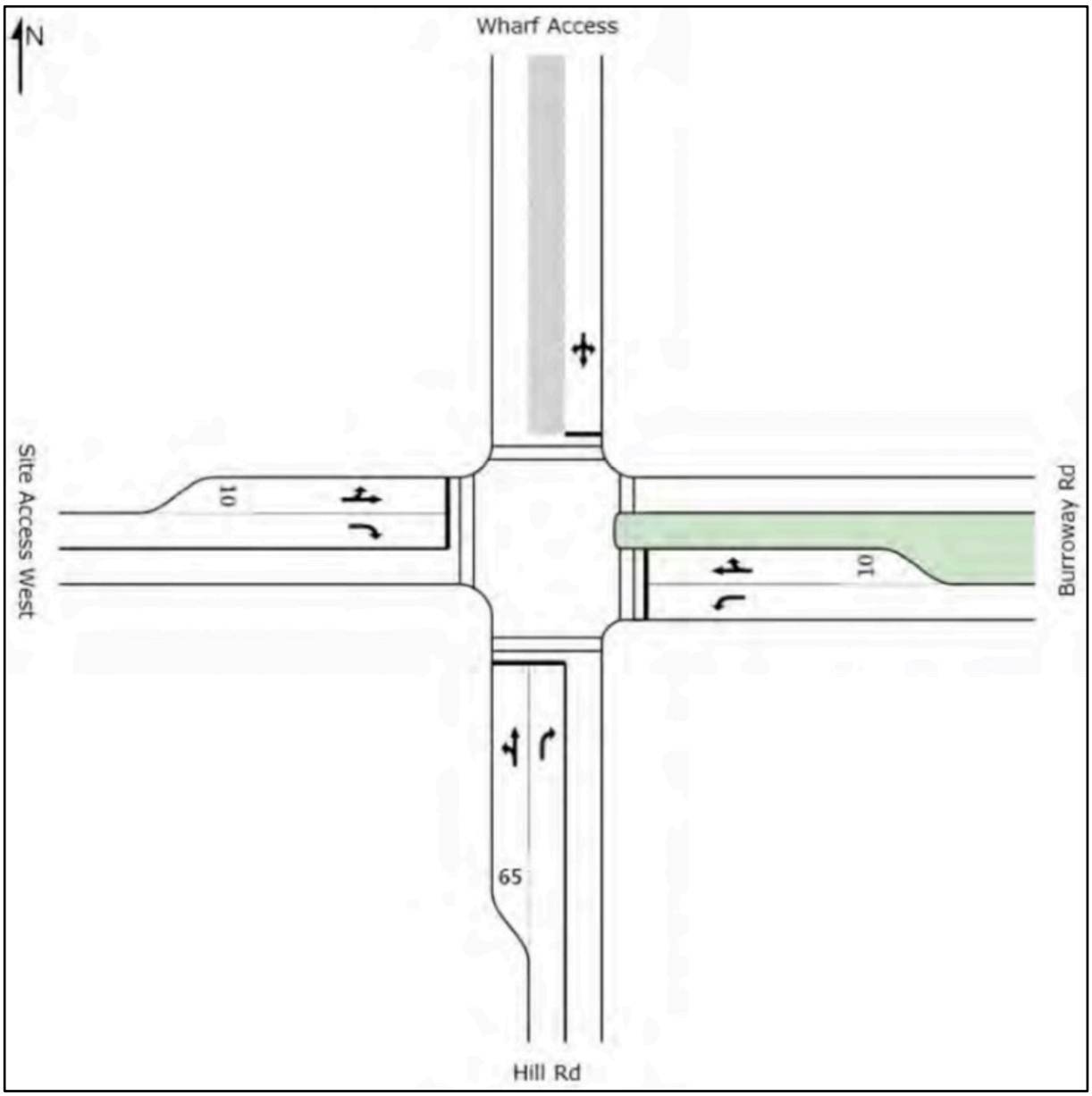


Figure 4 – Approved Signalised Intersection of Hill Rd x Burroway Rd

The 2014 Traffix TIS study adopted residential trip rates based on the (then) recently released data from RMS in the Technical Direction TDT 2013/04a, *Guide to Traffic Generating Developments – Updated traffic surveys* (the RMS Guide Update). This data was based on relatively recent survey data of high-density residential development in Sydney, providing a current reflection of the traffic demands of this type of development compared to the trip rate guidance from the RMS Guide that was adopted by the 2013 Traffix TIA study for the original Planning Proposal. The following summarises the RMS Guide Update trip rates that were adopted by the 2014 Traffix TIS study:

- 0.19 trips per unit during the morning peak hour, and
- 0.15 trips per unit during the evening peak hour.

It is noteworthy that the adoption of these trips rates in 2014 has since been endorsed by work undertaken by Arup in the area. With reference to the Arup report titled *Billbergia, Wentworth Point, Traffic and Transport Study*, dated 14 June 2017 (the Arup report), it is noteworthy that in accordance with RMS guidance, Arup undertook traffic surveys to determine the traffic generation rate of residential development within Wentworth Point. The survey was undertaken between the hours of 7:30AM – 8:30AM on Thursday 4 May 2017 at 9-19 Baywater Drive, Wentworth Point. The surveyed residential development consisted of 323 units, serviced by 421 parking spaces. The results of the survey indicated a morning peak hour traffic generation rate of 0.189 trips, consistent with the 0.19 trips provided by the RMS Guide Update.

Based on the design analysis undertaken at the time, it was assumed that the 188,800m^2 of approved GFA would translate into 1,720 units on the Western UAP site. Therefore, application of the adopted RMS trip rates to this level of development resulted in the following peak hour trip generation forecasts:

- 327 trips during the morning peak hour, and
- 258 trips during the evening peak hour.

Consistent with the earlier analysis, the 2014 Traffix TIS performance testing assigned all these trips to the proposed signalised intersection to ensure a conservative assessment of the intersection's design requirements would be provided. The analysis was also cumulative, including forecast demands at the intersection that would be generated by the Eastern UAP site and the SOPA site.

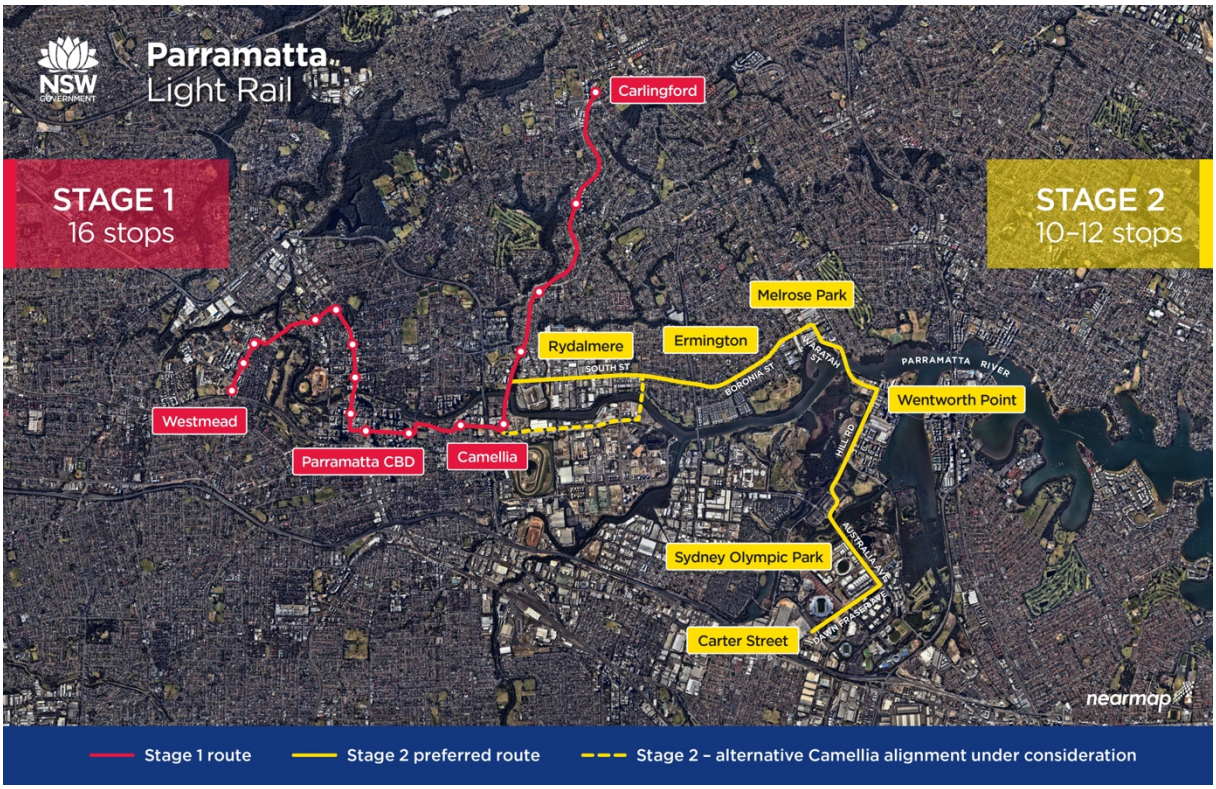
The SIDRA modelling results indicated that the proposed intersection as presented in the Brown Consulting plans would:

- Operate well with a Level of Service (LOS) of B during both peak hours.
- All proposed short lanes were sufficient in length to accommodate all forecast 95th-percentile queues.

In summary, the 2014 Traffix TIS concluded that the proposed signalised intersection of Hill Road with Burroway Road would satisfactorily accommodate the 188,800m^2 of approved high-density residential GFA, which – based on RMS Guide Update rates – would generate 258-327 peak hour trips.

1.2.3 Parramatta Light Rail Stage 2

In October 2017, the NSW Government announced the preferred route for Parramatta Light Rail Stage 2, which will connect to Stage 1 and run north of the Parramatta River through the rapidly developing suburbs of Ermington, Melrose Park and Wentworth Point to Sydney Olympic Park, providing a new public transport option to this booming sport, entertainment and employment hub.



Source: http://www.parramattalightrail.nsw.gov.au/stage-2

Figure 5 – Parramatta Light Rail Route Map

Since the announcement of the preferred route for Stage 2, TfNSW's Parramatta Light Rail (PLR) team has been developing Stage 2 via consultation with the community and stakeholders. This has included working with Sekisui House to determine how a transport corridor through the Site – that meets design requirements of light rail – could be accommodated as part of this Planning Proposal.

The transport corridor is intended to connect via a new bridge across the Parramatta river to the Melrose Park precinct that is currently undergoing a rezoning process for mixed-use development with high-density residential and a local town centre. Should development at Melrose Park progress well in advance of the delivery of Stage 2 of the PLR, the transport corridor (including the bridge) is being

designed so it could accommodate buses in advance of the light rail and indeed the design is such that buses could continue to share the route once Stage 2 of the PLR becomes operational.

1.3 Overview of Proposal

1.3.1 Proposed LEP and DCP Amendments

For a full description of the proposed amendments to the approved Master Plan and adopted WPP DCP that are sought by this Proposal, reference should be made to the Planning Proposal report prepared by Sutherland & Associates Planning (the Sutherland report) and the accompanying Amended Planning Maps prepared by Turner Architects (the Turner plans). **Figure 6** presents the revised Master Plan for the Site prepared by Turner Architects.

Figure 6 – Proposed Master Plan

To provide context to the above, the following presents the proposed amendments that are sought by the Proposal, as summarised in the Sutherland report:

- *amend the 'Land Zoning Map' to increase the area of the RE1 zone with a corresponding reduction of the R4 zone for the site and the introduction of a B4 Mixed Use zone,*
- *amend the 'Height of Buildings Map' to provide a range of heights across R4 and B4 zoned areas of the site from 44 metres to 146 metres,*

- *amend the Floor Space Ratio Map to provide individual FSRs for the development parcels across the R4 and B4 zoned area of the site to reflect a gross floor area of 228,800 square metres for the overall site which is an increase of 40,000 square metres above the 188,800 square metres currently provided for the site, and;*
- *amend the Acquisition Map to:*
  - *reflect the increased RE1 zone*
  - *secure a transport corridor through the site* (see Figure 7)
  - *exclude the foreshore wharf from public acquisition so that it can be retained, refurbished and operated as a café by the community association,*
- *introduce an additional permitted use under Schedule 1 of the ALEP 2010 to allow 'food and drink premises' as a permissible use in the RE1 zone on the site.*

Figure 7 – Proposed Master Plan showing indicative Transport Corridor

The Sutherland report also provides the following in relation to the DCP amendments:

> *… the Planning Proposal is also accompanied by a proposed amendment to the Wentworth Point Precinct Development Control Plan 2014 to give effect to the masterplan which forms the basis of this Planning Proposal. The primary amendments include the identification of a new street layout for the site, identification of open space, identification of the transport corridor, identification of heights of buildings across the site, and a distribution of the gross floor area across the site.*

It is noted that the DCP amendments also include changes to the minimum parking rates.

1.4 Study Objectives

This TA addresses the relevant traffic, access and parking implications of the Proposal. The following summarises the key study objectives of this TA:

Traffic Impacts

The Proposal seeks an additional 40,000m^2 of predominantly residential GFA for the Site above the approved 188,800m^2. In addition, the latest detailed design analysis indicates that the 228,800m^2 of GFA could accommodate approximately 2,600 units on the Sanctuary site.

In light of the above, the following summarises the key traffic objectives of this TA:

- Revisit the traffic analysis to provide a high-level assessment of the scale of residential development that the Site could support without exceeding the permitted impacts of the approved Master Plan, thereby establishing the likely traffic implications of the current Proposal on the wider road network.
- Revisit the SIDRA Intersection modelling of the 2014 Traffix TIS study to assess the adequacy of the approved signalised intersection of Hill Road with Burroway Road to accommodate the extra traffic associated with the Proposal.
- Provide a high-level assessment of the traffic implications of introducing mixed-use development at the Site that could deliver approximately 2,000m^2 of potential non-residential uses.

Access & Road Network

The key access objective is to provide commentary on the revised road network of the DCP, noting that it includes a more extensive network of local roads and streets and includes a potential tertiary access in the northeast corner of the Site. Importantly, a key factor driving the modified road network has been the provision of a transport corridor through the Sanctuary site that meets the design requirements of light rail.

Parking

The key parking objective is to provide commentary on the revised parking rates of the WPP DCP, noting that they generally propose a reduction in the minimum parking requirements. It is noted that the DCP amendments include controls for providing parking under privately owned/publicly accessible internal streets, and the provision of all visitor parking on-street.

1.5 Report Structure

The report is structured as follows:

- Section 2 assesses the traffic impacts of the Proposal.
- Section 3 assesses the amended access and road network.
- Section 4 assesses the amended parking controls.
- Section 5 provides a summary of the key conclusions.

2 Traffic Impacts

2.1 Trip Rates

In order to assess the traffic implications of the current Proposal, the following presents the RMS average high-density residential trip generation rates that were adopted by the 2014 Traffix TIS study that supported the approved DA 274/2014 and DA 41/2015 submissions, and subsequently endorsed by the traffic survey results presented in the Arup report:

- 0.19 trips per unit during the morning peak hour, and
- 0.15 trips per unit during the evening peak hour.

Notwithstanding the above basis for the adoption of these trip generation rates for this Planning Proposal, further traffic surveys of comparable developments was determined the most reliable method for verifying the actual peak trip generation rates which are currently occurring in Wentworth Point, in accordance with RMS guidance and policy.

Accordingly, traffic count surveys of the Jewel Development – located immediately adjacent to the Site at 1 Burroway Road – have been undertaken to derive trip rates for assessing future development on the subject Site. The traffic count surveys were undertaken between 28 May – 30 May 2018. Entry and exit movements were recorded between 6.00-9.00AM to assess the morning peak hour and 3.00-7.00PM to assess the evening peak hour.

Based on information provided by the Building Manager, all 256 apartments are now fully settled, with 248 occupied during the survey period. It is not unusual for a small proportion of apartments to be vacant for any fully 'occupied' building, noting periods where apartments have a changeover in ownership or tenancy, thus our analysis has been based on 256 apartments. **Table 1** provides a summary of the peak trips generated by the Jewel Development and the resulting trip generation rate.

Table 1: Jewel Development Traffic Survey Results

Day	AM Peak Hour			PM Peak Hour		
	Time	Trips	Trip Rate	Time	Trips	Trip Rate
Monday 28/05/18	07:30-08:30	46	0.18	17:30-18:30	56	0.22
Tuesday 29/05/18	07:30-08:30	43	0.17	17:30-18:30	52	0.20
Wednesday 30/05/18	07:00-08:00	45	0.18	17:15-18:15	59	0.23
Average	**-**	**45**	**0.18**	**-**	**56**	**0.22**

The results demonstrate that the peak hour trips were relatively consistent throughout the survey period with a morning peak hour range of between 43-46 vehicles per hour and an evening peak hour range of between 52-59 vehicles per hour. The average peak hour trip rates per unit were found to be:

- 0.18 trips per unit for the morning peak hour, and
- 0.22 trips per unit for the evening peak hour.

The survey results for the morning peak hour are consistent with the RMS rate of 0.19 and with the rate found by Arup for the Billbergia development, whilst the evening peak hour rate is marginally higher. These trip rates have been adopted for the following traffic analysis; relevant survey data is attached at **Appendix A**.

2.2 Traffic Impact Analysis

2.2.1 Wider Road Network

The 'approved' traffic generation for the Sanctuary site on the wider road network (i.e. beyond the proposed signalised Intersection of Hill Road with Burroway Road) was defined by the 2013 Traffix TIA that supported the original Planning Proposal. With reference to Section 1.2.1, it is noted that the 2013 Traffix TIA – based on available trip rate data at the time – set the 'approved' traffic generation of the Site at:

- 602 trips during the morning peak hour, and
- 602 trips during the evening peak hour.

This peak period volume forms the traffic 'budget' for which development on the Site should be validated against.

Table 2 provides a comparison of the number of units the Site could accommodate (whilst remaining consistent with the approved traffic budget) based on the trip rates adopted for the 2013 Traffix TIA for the original Master Plan and the latest trip rates derived from the 2018 traffic surveys.

Table 2: Traffic Generation Comparison

Source	Period	Trip Rate	Maximum Units Permissible	Peak Hour Trips
RMS Guide (2002) – Rate adopted for 2013 Western UAP	AM	0.35	1,720	602
	PM	0.35		602
May 2018 traffic count surveys	AM	0.18	2,736	492
	PM	0.22		602

The trip generation analysis indicates that based on the 2018 traffic survey data, the Site could accommodate 2,736 units whilst remaining consistent with the traffic budget for the Site. Applying the trip generation rate from the 2018 traffic surveys to the 2,736 units would result in:

- 492 morning peak hour trips – 18.3% fewer trips than anticipated for the approved Master Plan.
- 602 evening peak hour trips – Consistent with the trips anticipated for the approved Master Plan.

In summary, the analysis above demonstrates that the traffic generation approved for the Site under the original Master Plan approval can support up to 2,736 units based on current 2018 trip rate data without resulting in impacts on the wider road network that are greater than the impacts associated with the approved Master Plan. Accordingly, the residential yield estimate of approximately 2,600 units for the current Proposal is supportable on traffic planning grounds as it is below the 2,736-unit threshold and would therefore be expected to have reduced traffic impacts compared with the approved Master Plan.

2.2.2 Key Signalised Intersection of Hill Road with Burroway Road

With reference to Section 1.2.2, it is noted that the 2014 Traffix TIS study assessed the adequacy of the Brown Consulting design of the proposed signalised intersection, based on the following traffic generation forecasts for the Site:

- 327 trips during the morning peak hour, and
- 258 trips during the evening peak hour.

By comparing the above with the latest traffic forecasts for a 2,736-unit development, it can be determined that development at the Site could generate up to:

- 165 additional peak hour trips at the primary access intersection during the morning peak hour.
- 344 additional peak hour trips at the primary access intersection during the evening peak hour.

To assess the impacts of this additional traffic at the proposed intersection – the delivery of which (by others) is unaffected by this Proposal – performance testing has been undertaken using SIDRA Intersection modelling. In this regard, SIDRA modelling outputs a range of performance measures, in particular:

- Degree of Saturation (DOS) – The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity. As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is usual to attempt to keep DOS to less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.
- Average Vehicle Delay (AVD) – The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- Level of Service (LOS) – This is a comparative measure that provides an indication of the operating performance, based on AVD.

Table 3 provides a recommended baseline for assessment as per the RMS Guide.

Table 3: Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

The following summarises key characteristics and assumptions adopted for the SIDRA modelling:

- The SIDRA analysis for the 1,720-unit scheme presented in the 2014 Traffix TIS has been revisited noting that it was undertaken with SIDRA Intersection 6 version, not the current SIDRA Intersection 7 version. This will enable a consistent comparison of the results.
- The intersection layout is based on the SIDRA layout from the 2014 Traffix TIS and has been checked against the approved Brown Consulting civil plans for the intersection.
- Phasing and a 60-second cycle time has been adopted, consistent with our understanding of the parameters adopted by the 2014 Traffix TIS study.
- A conservative assessment has again been adopted, with all traffic forecast for the Site 'loaded' onto the primary access western approach to the signalised intersection (i.e. no reliance on the retained secondary access or proposed tertiary access).
- Trip distribution assumptions are consistent with the assumptions adopted by the 2014 Traffix TIS study.
- Assumptions about the traffic generating potential of local committed/proposed developments (i.e. the Eastern UAP site and the SOPA site) are consistent with the assumption adopted by the 2014 Traffix TIS study.

On the basis of the above, **Table 4** provides a comparison of the SIDRA Intersection results for the approved signalised intersection design under the previous 1,720-unit scheme, and a potential 2,736-unit scheme.

Table 4: Proposed Signalised Intersection of Hill Road with Burroway Road – SIDRA Results

Period	1,720-Unit Scheme			2,736-Unit Scheme			*Net Change*		
	DOS	**AVD**	**LOS**	**DOS**	**AVD**	**LOS**	***DOS***	***AVD***	***LOS***
Morning	0.675	21.5s	B	0.843	26.0s	B	*+ 0.168*	*+ 4.5s*	*no change*
Evening	0.570	18.4s	B	0.714	19.4s	B	*+ 0.144*	*+ 1.0s*	*no change*

The SIDRA results indicate that under the former 1,720-unit scheme, the intersection would operate well, with average delays of 18.4-21.5 seconds resulting in a Level of Service of B (good performance).

As expected, the results for the current 2,300-unit scheme indicate minor increases in DOS and AVD; however, the intersection would continue to operate well, with average delays of 19.4-26.0 seconds maintaining a Level of Service of B. The detailed SIDRA outputs are attached at **Appendix A**.

In summary, the SIDRA analysis above demonstrates that the approved signalised intersection of Hill Road with Burroway Road – the delivery of which (by others) is unaffected by this Proposal – would adequately accommodate the additional traffic movements of a development of up to 2,736 units on the Sanctuary site. Accordingly, the residential yield estimate of approximately 2,600 units for the current Proposal is supportable on traffic planning grounds as it is below the 2,736-unit threshold.

2.2.3 Mixed-Use Development

The proposed amendment to permit mixed-use development would indicatively introduce approximately 2,000m^2 of non-residential, predominantly retail, uses – which would represent just 0.87% of the proposed 228,800m^2 of GFA – would be expected to generate little (if any) additional traffic on the study road network, particularly during the morning and evening peak hours. At peak commuter periods, it is expected that the majority of customers to these uses would be local residents from within the Sanctuary (or the northern end of Wentworth Point) who would have predominantly accessed these uses using active transport modes (walking or cycling) or as a linked trip attached to a commute trip from or to their place of residence. This would also be the case for the child care centre proposed for the community space within the Foreshore Park phase.

In summary, the inclusion of approximately 2,000m^2 of non-residential uses (including the child care centre) would have no material impact on the operation of the key signalised intersection of Hill Road with Burroway Road, nor the wider road network.

3 Access & Road Network

3.1 Proposed Access Amendments

Based on data extracted from the Turner plans, **Figure 8** presents the street network of the approved Master Plan and the street network of the revised Master Plan.

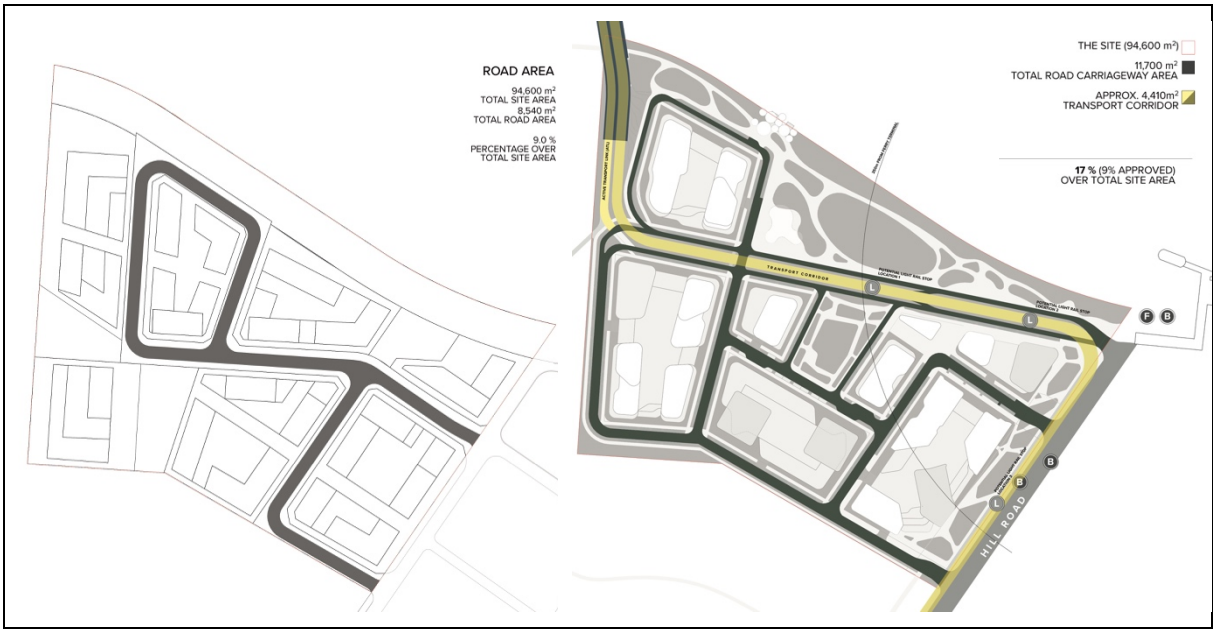


Figure 8 – Approved Master Plan and Proposed Master Plan Street Network

The Sutherland report indicates that the Proposal introduces, "*a new privately owned but publicly accessible road network throughout the site with a perimeter road around the entire site and a variety of east-west and north-south roads which create individual street blocks*".

The Sutherland report also states that the Proposal creates an improved road network through the Site that:

- *clearly differentiates the foreshore park as publicly accessible by the introduction of a foreshore road which continues the road alignment established by the eastern adjacent site,*
- *creates approximately twice the length of road for optimal connectivity, street address and on-street car parking,*
- *provides a perimeter road along the southern and western boundaries which provides contingency in the event that the future light rail is located adjacent to these boundaries.*

Figure 9 presents the adopted WPP DCP street network plan and the proposed WPP DCP street network plan.

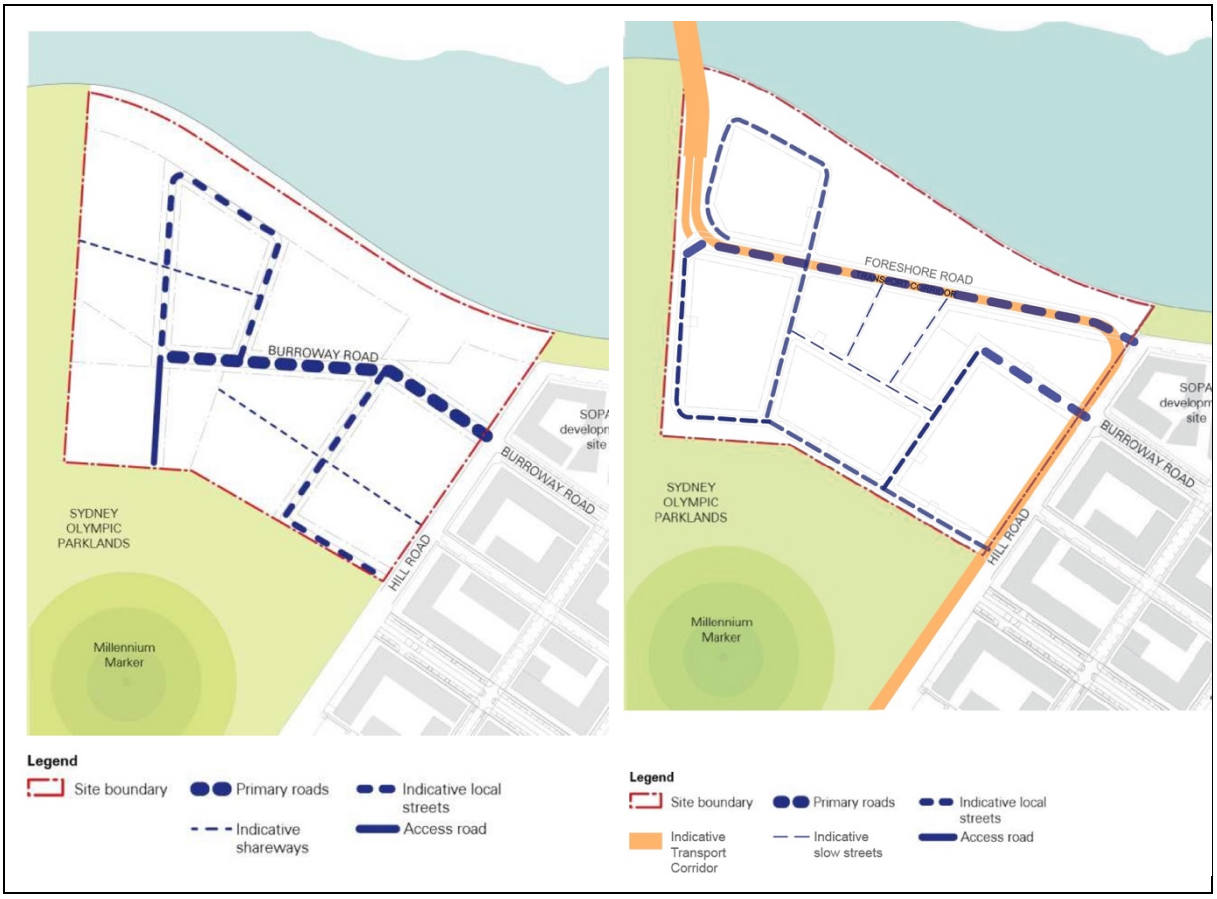


Figure 9 – Adopted WPP DCP and Proposed WPP DCP Street Network Plan

3.2 Access & Road Network Discussion

The additional roads and streets maximise the permeability through the Site for active transport modes of walking and cycling. This will greatly improve the Site's connectivity via non-car modes to the Ferry Wharf, commercial/retail uses in the area (especially at the SOPA site), the future school at the Eastern UAP site, Rhodes via the Bennelong Bridge, and future stops for the proposed Stage 2 of the Parramatta Light Rail.

The street network is connected to the primary access (west approach) to the future signalised intersection of Hill Road with Burroway Road, ensuring that all traffic can access and egress the Site via the signalised intersection, consistent with the approved Master Plan and consistent with the SIDRA analysis presented in Section 2.2.2.

The layout also shows a greater focus on the proposed road that connects to Hill Road at the secondary access location at the southwest corner of the Site. Despite the analysis indicating that all forecast traffic demand could be accommodated at the primary access intersection, the greater focus on the

secondary access would provide some relief to the future signalised intersection, particularly as an alternative route for inbound traffic during the evening peak hour.

The Proposal also includes a new access connection to Hill Road at the northeast corner of the Site. Whilst the street proposed to extend westward into the Site from this connection is considered a Primary access connection, the streets key function will be to provide access for public transport using the transport corridor (light rail and buses), with its secondary function being to cater for pedestrians and cyclists. Accordingly, vehicular traffic volumes at the proposed connection with Hill Road would be relatively low.

In summary, the revised street network greatly improves the permeability of the Site and the ability for pedestrians and cyclists to travel directly through the Site to access key local facilities and public transport services. The access arrangement retains the primary access at the proposed signalised intersection of Hill Road with Burroway Road and the secondary access to the southwest corner of the Site, consistent with the approved Master Plan. A new access connection to Hill Road at the northeast corner of the Site would be primarily for public transport access as well as pedestrian and cyclist (active transport) connectivity.

4 Parking

4.1 Proposed Parking Amendments

The Sutherland report states that the Proposal includes amendments to the WPP DCP in relation to car parking as follows.

- *The amendments seek to allow basement car parking underneath the roads where they are retained in private ownership. Due to the contaminated nature of the land, the DCP already provides for the elevation of roads on imported fill, however, a more environmentally sound approach is to elevate the roads on structure rather than imported fill, which provides the opportunity for parking underneath roads where there is sufficient clearance. Given that the roads will be retained in private ownership, but with complete public access, there is no liability issue with car parking under roads.*
- *The amendments seek to rely on on-street parking for satisfaction of the visitor parking requirement because this parking will remain part of the site in private ownership. Furthermore, the desire to introduce deep soil zones within the basement underneath streets to facilitate mature street trees cause displacement of basement area which could otherwise be occupied by visitor parking. Finally, on-street parking is considered to be the most efficient and user friendly method for visitors to park and avoid basement access and security issues as well as the unauthorised use of basement visitor parking by residents.*
- *The amendments seek a reduction to the minimum car parking requirements in the DCP in anticipation of the new light rail network being implemented which will allow a reduction in car parking provision for residents. This will have a positive outcome in relation to traffic generation resulting from the development of the site.*

4.2 Parking Discussion

The placement of car parking under internal roads and streets that are retained in private ownership, but with complete public access, is supported as an efficient response to the site-specific constraints of contaminated land and a water table that makes providing multiple levels of basement parking problematic. From a traffic design point of view, there is no concern that parking located under a street or road could not be provided in accordance with relevant AS2890 Australian Standards.

The reliance on on-street parking for the majority (or all) of the visitor parking is also supported, again as an efficient response to the issues faced by the Site. Similar to other projects in the area, it is anticipated that due to the proximity of the Site to the Ferry terminal, the on-street parking will be subject to time restrictions that will be enforced by Council officers. As a result, the provision of visitor parking

on-street would significantly reduce the opportunities for local residents to improperly use visitor parking spaces, as often occurs when visitor parking is provided in an 'un-policed' basement arrangement. Accordingly, this measure would assist with reducing car ownership, encourage public and active transport use and subsequently manage traffic demands on the road network.

With regard to reduced minimum parking rates, **Table 5** presents the adopted WPP DCP rates, the proposed parking rates and the RMS Guide parking rates (under SEPP 65 and ADG guidance) that will be applicable to the Site.

Table 5: Adopted WPP DCP, Proposed WPP DCP and RMS Parking Rates

Use	Adopted WPP DCP	Proposed WPP DCP	RMS
Studio	1.0 space / unit	0.0 spaces / unit	0.6 spaces / unit
1-bedroom	1.0 space / unit	0.5 spaces / unit	0.6 spaces / unit
2-bedroom	1.1 spaces / unit	1.0 space / unit	0.9 spaces / unit
3-bedroom	2.0 spaces / unit	1.0 space / unit	1.4 spaces / unit
Visitors	0.1 spaces / unit	0.1 spaces / unit	0.2 spaces / unit

It must be recognised that these proposed parking rates are minimum rates and therefore do not strictly prohibit a parking provision that is consistent with current adopted WPP DCP parking rates. However, it would be expected that with reduced minimum parking rates, the eventual parking provision would be lower than that provided under the current rates.

Having consideration for the level of existing and future public transport services that will serve the area (existing ferry services, buses, including bus services that connect to Rhodes train station via the Bennelong Bridge, and the proposed light rail), and the WPP DCP requirement that residential development, "*is to provide an appropriate number of car share parking spaces for the exclusive use of car share scheme vehicles*", the reduced minimum parking rates are supported for the following reasons:

- The 0.0-0.5 space requirement for studios and 1-bed units permits the opportunity to provide 'car free' development. Accordingly, residents who have no desire to own a car, will be able to purchase units that do not have the additional cost of a parking spaces attached to their unit, thereby taking advantage of the local facilities within walking distance, public transport services for regular commuting and car share vehicles for the occasional trips that require a vehicle.
- The 0.5 spaces for 1-bedroom units is only marginally lower than the RMS requirement of 0.6 spaces per unit, and the 1.0 space per 2-bedroom unit is marginally higher than the RMS requirement of 0.9 spaces per unit.

- The 1.0 space per 3-bedroom unit would reduce car ownership and encourage public and active transport use, thereby reducing demands on the local road network.
- The adopted visitor parking rate – which already represents a limited parking provision – is to be retained.
- It is noted that many recently rezoned precincts surrounding committed Stage 1 PLR stops have been rezoned with maximum parking rates, acknowledging that the greater public transport accessibility provided by light rail would reduce car parking demand.

In summary, the proposed WPP DCP amendments to the car parking rates are supportable having consideration for the level of existing and future public transport accessibility, the requirement to provide car share spaces and the opportunity it presents to reduce car ownership, encourage public and active transport and thereby reduce vehicular traffic demand on the road network.

Furthermore, the amended controls to permit the placement of parking under internal roads and streets and visitor parking on-street, are also supported as efficient responses to the site-specific constraints of the Site, can be achieved in accordance with relevant Australian Standards and would restrict improper use of visitor parking by residents, again resulting in reduced car ownership, and therefore reduced vehicular traffic demand on the road network.

5 Conclusions

The key findings of this Traffic Impact Assessment are:

- Ason Group has been commissioned by Sekisui House Australia Pty Ltd to prepare a TA for a Planning Proposal for the subject site of 14-16 Hill Road, Wentworth Point, referred to as the Sanctuary.
- The Planning Proposal seeks to amend the LEP to reflect a revised Master Plan for the Site that provides for 228,800m^2 of GFA redistributed across the Site via an alternative street layout as well as an alternative arrangement of building locations, height and open space. A key component of the revised Master Plan is a significant increase in the publicly accessible open space which is a direct public benefit. Furthermore, the Site has been configured so that it makes a provision for a transport corridor for Stage 2 of the Parramatta Light Rail project. The Planning Proposal also seeks to allow for the inclusion of some non-residential uses within the Site.
- This TA study addresses the relevant traffic, access and parking implications of the Proposal. However, within the context of this Planning Proposal being for the modification of an existing Master Plan – as opposed to a wholly new Master Plan – the key objective of this study is to assess the consistency of the revised Master Plan with the approved Master Plan.
- The Proposal seeks an additional 40,000m^2 of predominantly residential GFA for the Site above the approved 188,800m^2. In addition, the latest detailed design analysis indicates that the 228,800m^2 of GFA could accommodate approximately 2,600 units on the Sanctuary site.
- Regarding traffic impacts on the wider road network, the analysis demonstrates that the traffic generation approved for the Site under the original Master Plan approval can support up to 2,736 units based on current 2018 trip rate data without resulting in impacts on the wider road network that are greater than the impacts associated with the approved Master Plan. Accordingly, the residential yield estimate of approximately 2,600 units for the current Proposal is supportable on traffic planning grounds as it is below the 2,736-unit threshold and would therefore be expected to have reduced traffic impacts compared with the approved Master Plan.
- Regarding the key signalised intersection of Hill Road with Burroway Road, SIDRA analysis demonstrates that the approved signalised intersection of Hill Road with Burroway Road – the delivery of which (by others) is unaffected by this Proposal – would adequately accommodate the additional traffic movements of a development of up to 2,736 units on the Sanctuary site. Accordingly, the residential yield estimate of approximately 2,600 units for the current Proposal is supportable on traffic planning grounds as it is below the 2,736-unit threshold.
- The inclusion of approximately 2,000m^2 of non-residential uses (including the child care centre) would have no material impact on the operation of the key signalised intersection of Hill Road with

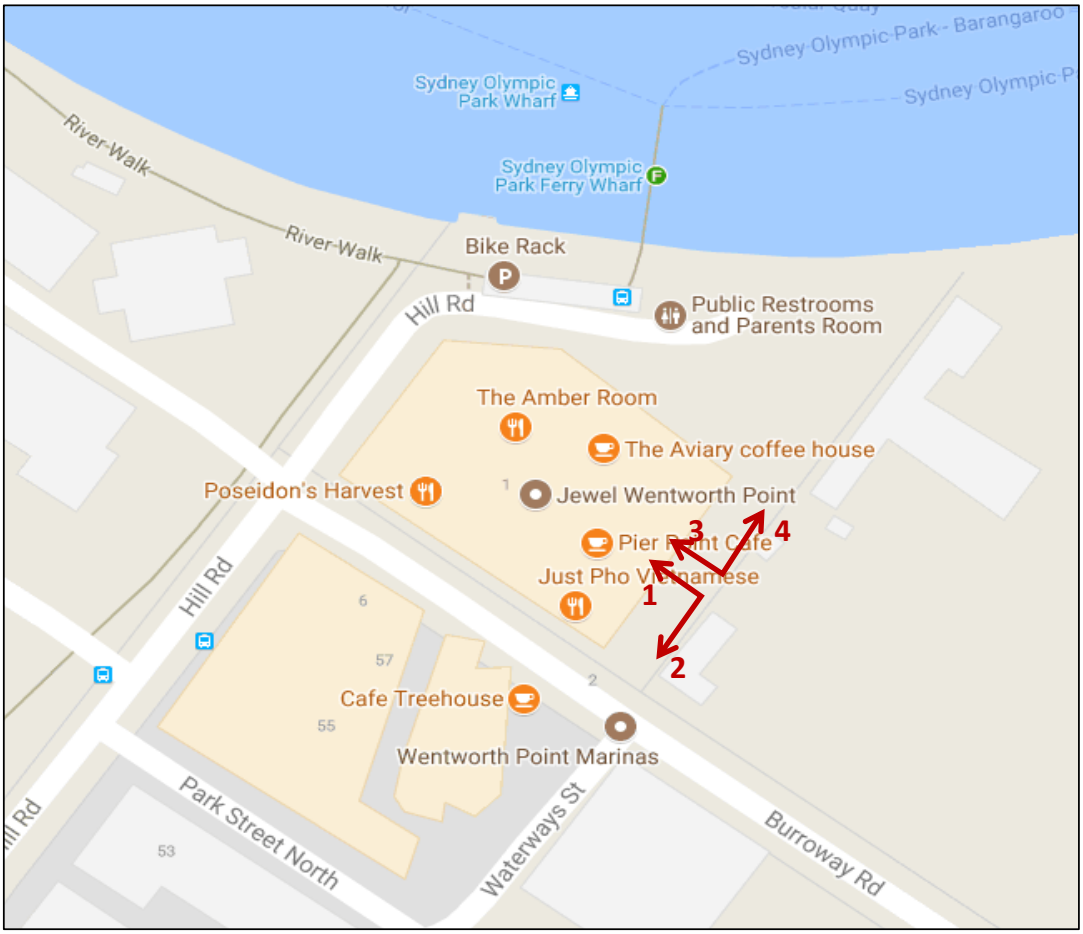
Burroway Road, nor the wider road network, during the commuter peak periods, as it is expected that the majority of customers to these uses would be local residents from within the Sanctuary (or the northern end of Wentworth Point) who would have predominantly accessed these uses using active transport modes (walking or cycling) or as a linked trip attached to a commute trip from or to their place of residence.

- The revised street network greatly improves the permeability of the Site and the ability for pedestrians and cyclists to travel directly through the Site to access key local facilities and public transport services. The access arrangement retains the primary access at the proposed signalised intersection of Hill Road with Burroway Road and the secondary access to the southwest corner of the Site, consistent with the approved Master Plan. A new access connection to Hill Road at the northeast corner of the Site would be primarily for public transport access as well as pedestrian and cyclist (active transport) connectivity.
- The proposed WPP DCP amendments to the car parking rates are supportable having consideration for the level of existing and future public transport accessibility, the requirement to provide car share spaces and the opportunity it presents to reduce car ownership, encourage public and active transport and thereby reduce vehicular traffic demand on the road network.
- The amended controls to permit the placement of parking under internal roads and streets and visitor parking on-street, are also supported as efficient responses to the site-specific constraints of the Site, can be achieved in accordance with relevant Australian Standards and would restrict improper use of visitor parking by residents, again resulting in reduced car ownership, and therefore reduced vehicular traffic demand on the road network.

It is therefore concluded that the Planning Proposal, revised Master Plan and amended DCP controls for 14-16 Hill Road, Wentworth Point is supportable on traffic planning grounds.

Appendix A

Client	Ason
Location	1 Burroway Road, Wentworth Point
Survey Time	6:00-9:00 & 15:00-19:00 (7hrs)
Description	Wentworth Point Access Surveys



Client	Ason
Location	1 Burroway Road, Wentworth Point
Date	Mon, 28th May 2018
Survey Time	6:00-9:00 & 15:00-19:00 (7hrs)
Description	Wentworth Point Access Surveys

MATRIX Traffic and Transport Data

[15mins interval]

Time Period	IN						OUT						Grand Total
	Direction 1			Direction 3			Direction 2			Direction 4			
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 6:15	0	0	**0**	0	0	**0**	3	0	**3**	1	0	**1**	**4**
6:15 to 6:30	0	0	**0**	1	0	**1**	3	0	**3**	0	0	**0**	**4**
6:30 to 6:45	1	0	**1**	2	0	**2**	6	0	**6**	0	0	**0**	**9**
6:45 to 7:00	1	0	**1**	2	0	**2**	4	0	**4**	1	0	**1**	**8**
7:00 to 7:15	0	0	**0**	3	0	**3**	3	0	**3**	1	0	**1**	**7**
7:15 to 7:30	2	0	**2**	0	0	**0**	4	0	**4**	0	0	**0**	**6**
7:30 to 7:45	1	0	**1**	0	0	**0**	14	0	**14**	0	0	**0**	**15**
7:45 to 8:00	1	0	**1**	1	0	**1**	8	0	**8**	1	0	**1**	**11**
8:00 to 8:15	1	0	**1**	0	0	**0**	5	0	**5**	0	0	**0**	**6**
8:15 to 8:30	3	0	**3**	2	0	**2**	8	0	**8**	1	0	**1**	**14**
8:30 to 8:45	5	0	**5**	2	0	**2**	3	0	**3**	0	0	**0**	**10**
8:45 to 9:00	3	0	**3**	0	0	**0**	5	0	**5**	1	0	**1**	**9**
AM Totals	**18**	**0**	**18**	**13**	**0**	**13**	**66**	**0**	**66**	**6**	**0**	**6**	**103**
15:00 to 15:15	1	0	**1**	0	0	**0**	1	0	**1**	0	0	**0**	**2**
15:15 to 15:30	1	0	**1**	1	0	**1**	6	0	**6**	1	0	**1**	**9**
15:30 to 15:45	3	0	**3**	0	0	**0**	1	0	**1**	0	0	**0**	**4**
15:45 to 16:00	2	0	**2**	0	0	**0**	2	0	**2**	1	0	**1**	**5**
16:00 to 16:15	8	0	**8**	2	0	**2**	4	0	**4**	0	0	**0**	**14**
16:15 to 16:30	7	0	**7**	0	0	**0**	1	0	**1**	0	0	**0**	**8**
16:30 to 16:45	3	0	**3**	5	0	**5**	7	0	**7**	0	0	**0**	**15**
16:45 to 17:00	7	0	**7**	1	0	**1**	2	0	**2**	0	0	**0**	**10**
17:00 to 17:15	5	0	**5**	0	0	**0**	3	0	**3**	0	0	**0**	**8**
17:15 to 17:30	3	0	**3**	4	0	**4**	3	0	**3**	0	0	**0**	**10**
17:30 to 17:45	8	0	**8**	2	0	**2**	4	0	**4**	0	0	**0**	**14**
17:45 to 18:00	9	0	**9**	0	0	**0**	1	0	**1**	1	0	**1**	**11**
18:00 to 18:15	6	0	**6**	3	0	**3**	7	0	**7**	1	0	**1**	**17**
18:15 to 18:30	8	0	**8**	2	0	**2**	4	0	**4**	0	0	**0**	**14**
18:30 to 18:45	6	0	**6**	0	0	**0**	3	0	**3**	0	0	**0**	**9**
18:45 to 19:00	10	0	**10**	1	0	**1**	1	0	**1**	2	0	**2**	**14**
PM Totals	**87**	**0**	**87**	**21**	**0**	**21**	**50**	**0**	**50**	**6**	**0**	**6**	**164**

[Hourly Summary]

	IN		OUT		
	Direction 1	Direction 3	Direction 2	Direction 4	

Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Grand Total
6:00 to 7:00	2	0	**2**	5	0	**5**	16	0	**16**	2	0	**2**	**25**
6:15 to 7:15	2	0	**2**	8	0	**8**	16	0	**16**	2	0	**2**	**28**
6:30 to 7:30	4	0	**4**	7	0	**7**	17	0	**17**	2	0	**2**	**30**
6:45 to 7:45	4	0	**4**	5	0	**5**	25	0	**25**	2	0	**2**	**36**
7:00 to 8:00	4	0	**4**	4	0	**4**	29	0	**29**	2	0	**2**	**39**
7:15 to 8:15	5	0	**5**	1	0	**1**	31	0	**31**	1	0	**1**	**38**
7:30 to 8:30	6	0	**6**	3	0	**3**	35	0	**35**	2	0	**2**	**46**
7:45 to 8:45	10	0	**10**	5	0	**5**	24	0	**24**	2	0	**2**	**41**
8:00 to 9:00	12	0	**12**	4	0	**4**	21	0	**21**	2	0	**2**	**39**
AM Totals	**18**	**0**	**18**	**13**	**0**	**13**	**66**	**0**	**66**	**6**	**0**	**6**	**103**
15:00 to 16:00	7	0	**7**	1	0	**1**	10	0	**10**	2	0	**2**	**20**
15:15 to 16:15	14	0	**14**	3	0	**3**	13	0	**13**	2	0	**2**	**32**
15:30 to 16:30	20	0	**20**	2	0	**2**	8	0	**8**	1	0	**1**	**31**
15:45 to 16:45	20	0	**20**	7	0	**7**	14	0	**14**	1	0	**1**	**42**
16:00 to 17:00	25	0	**25**	8	0	**8**	14	0	**14**	0	0	**0**	**47**
16:15 to 17:15	22	0	**22**	6	0	**6**	13	0	**13**	0	0	**0**	**41**
16:30 to 17:30	18	0	**18**	10	0	**10**	15	0	**15**	0	0	**0**	**43**
16:45 to 17:45	23	0	**23**	7	0	**7**	12	0	**12**	0	0	**0**	**42**
17:00 to 18:00	25	0	**25**	6	0	**6**	11	0	**11**	1	0	**1**	**43**
17:15 to 18:15	26	0	**26**	9	0	**9**	15	0	**15**	2	0	**2**	**52**
17:30 to 18:30	31	0	**31**	7	0	**7**	16	0	**16**	2	0	**2**	**56**
17:45 to 18:45	29	0	**29**	5	0	**5**	15	0	**15**	2	0	**2**	**51**
18:00 to 19:00	30	0	**30**	6	0	**6**	15	0	**15**	3	0	**3**	**54**
PM Totals	**87**	**0**	**87**	**21**	**0**	**21**	**50**	**0**	**50**	**6**	**0**	**6**	**164**

[Peak Hour Summary]

		IN						OUT						
		Direction 1			Direction 3			Direction 2			Direction 4			
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Grand Total
AM	7:30 to 8:30	6	0	**6**	3	0	**3**	35	0	**35**	2	0	**2**	**46**
PM	17:30 to 18:30	31	0	**31**	7	0	**7**	16	0	**16**	2	0	**2**	**56**

Client	Ason
Location	1 Burroway Road, Wentworth Point
Date	Tue, 29th May 2018
Survey Time	6:00-9:00 & 15:00-19:00 (7hrs)
Description	Wentworth Point Access Surveys

MATRIX Traffic and Transport Data

[15mins interval]

Time Period	IN						OUT						Grand Total
	Direction 1			Direction 3			Direction 2			Direction 4			
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 6:15	0	0	**0**	0	0	**0**	3	0	**3**	1	0	**1**	**4**
6:15 to 6:30	2	0	**2**	0	0	**0**	6	0	**6**	1	0	**1**	**9**
6:30 to 6:45	2	0	**2**	0	0	**0**	3	0	**3**	1	0	**1**	**6**
6:45 to 7:00	1	0	**1**	4	0	**4**	8	0	**8**	1	0	**1**	**14**
7:00 to 7:15	0	0	**0**	0	0	**0**	5	0	**5**	0	0	**0**	**5**
7:15 to 7:30	0	0	**0**	0	0	**0**	3	0	**3**	0	0	**0**	**3**
7:30 to 7:45	3	0	**3**	0	0	**0**	8	0	**8**	1	0	**1**	**12**
7:45 to 8:00	3	0	**3**	0	0	**0**	8	0	**8**	1	0	**1**	**12**
8:00 to 8:15	2	0	**2**	0	0	**0**	6	0	**6**	0	0	**0**	**8**
8:15 to 8:30	1	0	**1**	0	0	**0**	10	0	**10**	0	0	**0**	**11**
8:30 to 8:45	1	0	**1**	1	0	**1**	5	0	**5**	0	0	**0**	**7**
8:45 to 9:00	3	0	**3**	0	0	**0**	5	0	**5**	0	0	**0**	**8**
AM Totals	**18**	**0**	**18**	**5**	**0**	**5**	**70**	**0**	**70**	**6**	**0**	**6**	**99**
15:00 to 15:15	3	0	**3**	0	0	**0**	2	0	**2**	0	0	**0**	**5**
15:15 to 15:30	1	0	**1**	0	0	**0**	6	0	**6**	0	0	**0**	**7**
15:30 to 15:45	1	0	**1**	1	0	**1**	5	0	**5**	1	0	**1**	**8**
15:45 to 16:00	0	0	**0**	2	0	**2**	2	0	**2**	0	0	**0**	**4**
16:00 to 16:15	0	0	**0**	6	0	**6**	2	0	**2**	0	0	**0**	**8**
16:15 to 16:30	1	0	**1**	6	0	**6**	0	0	**0**	0	0	**0**	**7**
16:30 to 16:45	3	0	**3**	0	0	**0**	1	0	**1**	1	0	**1**	**5**
16:45 to 17:00	7	0	**7**	1	0	**1**	1	0	**1**	2	0	**2**	**11**
17:00 to 17:15	8	0	**8**	2	0	**2**	4	0	**4**	0	0	**0**	**14**
17:15 to 17:30	2	0	**2**	0	0	**0**	1	0	**1**	1	0	**1**	**4**
17:30 to 17:45	10	0	**10**	3	0	**3**	1	0	**1**	1	0	**1**	**15**
17:45 to 18:00	6	0	**6**	3	0	**3**	4	0	**4**	1	0	**1**	**14**
18:00 to 18:15	9	0	**9**	1	0	**1**	1	0	**1**	0	0	**0**	**11**
18:15 to 18:30	6	0	**6**	0	0	**0**	5	0	**5**	1	0	**1**	**12**
18:30 to 18:45	8	0	**8**	1	0	**1**	1	0	**1**	0	0	**0**	**10**
18:45 to 19:00	2	0	**2**	2	0	**2**	2	0	**2**	0	0	**0**	**6**
PM Totals	**67**	**0**	**67**	**28**	**0**	**28**	**38**	**0**	**38**	**8**	**0**	**8**	**141**

[Hourly Summary]

	IN		OUT		
	Direction 1	Direction 3	Direction 2	Direction 4	

Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Grand Total
6:00 to 7:00	5	0	**5**	4	0	**4**	20	0	**20**	4	0	**4**	**33**
6:15 to 7:15	5	0	**5**	4	0	**4**	22	0	**22**	3	0	**3**	**34**
6:30 to 7:30	3	0	**3**	4	0	**4**	19	0	**19**	2	0	**2**	**28**
6:45 to 7:45	4	0	**4**	4	0	**4**	24	0	**24**	2	0	**2**	**34**
7:00 to 8:00	6	0	**6**	0	0	**0**	24	0	**24**	2	0	**2**	**32**
7:15 to 8:15	8	0	**8**	0	0	**0**	25	0	**25**	2	0	**2**	**35**
7:30 to 8:30	9	0	**9**	0	0	**0**	32	0	**32**	2	0	**2**	**43**
7:45 to 8:45	7	0	**7**	1	0	**1**	29	0	**29**	1	0	**1**	**38**
8:00 to 9:00	7	0	**7**	1	0	**1**	26	0	**26**	0	0	**0**	**34**
AM Totals	**18**	**0**	**18**	**5**	**0**	**5**	**70**	**0**	**70**	**6**	**0**	**6**	**99**
15:00 to 16:00	5	0	**5**	3	0	**3**	15	0	**15**	1	0	**1**	**24**
15:15 to 16:15	2	0	**2**	9	0	**9**	15	0	**15**	1	0	**1**	**27**
15:30 to 16:30	2	0	**2**	15	0	**15**	9	0	**9**	1	0	**1**	**27**
15:45 to 16:45	4	0	**4**	14	0	**14**	5	0	**5**	1	0	**1**	**24**
16:00 to 17:00	11	0	**11**	13	0	**13**	4	0	**4**	3	0	**3**	**31**
16:15 to 17:15	19	0	**19**	9	0	**9**	6	0	**6**	3	0	**3**	**37**
16:30 to 17:30	20	0	**20**	3	0	**3**	7	0	**7**	4	0	**4**	**34**
16:45 to 17:45	27	0	**27**	6	0	**6**	7	0	**7**	4	0	**4**	**44**
17:00 to 18:00	26	0	**26**	8	0	**8**	10	0	**10**	3	0	**3**	**47**
17:15 to 18:15	27	0	**27**	7	0	**7**	7	0	**7**	3	0	**3**	**44**
17:30 to 18:30	31	0	**31**	7	0	**7**	11	0	**11**	3	0	**3**	**52**
17:45 to 18:45	29	0	**29**	5	0	**5**	11	0	**11**	2	0	**2**	**47**
18:00 to 19:00	25	0	**25**	4	0	**4**	9	0	**9**	1	0	**1**	**39**
PM Totals	**67**	**0**	**67**	**28**	**0**	**28**	**38**	**0**	**38**	**8**	**0**	**8**	**141**

[Peak Hour Summary]

		IN						OUT						
		Direction 1			Direction 3			Direction 2			Direction 4			
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Grand Total
AM	7:30 to 8:30	9	0	**9**	0	0	**0**	32	0	**32**	2	0	**2**	**43**
PM	17:30 to 18:30	31	0	**31**	7	0	**7**	11	0	**11**	3	0	**3**	**52**

Client	Ason
Location	1 Burroway Road, Wentworth Point
Date	Wed, 30th May 2018
Survey Time	6:00-9:00 & 15:00-19:00 (7hrs)
Description	Wentworth Point Access Surveys

MATRIX Traffic and Transport Data

[15mins interval]

Time Period	IN						OUT						Grand Total
	Direction 1			Direction 3			Direction 2			Direction 4			
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 6:15	0	0	**0**	0	0	**0**	3	0	**3**	1	0	**1**	**4**
6:15 to 6:30	1	0	**1**	0	0	**0**	2	0	**2**	0	0	**0**	**3**
6:30 to 6:45	1	0	**1**	0	0	**0**	4	0	**4**	1	0	**1**	**6**
6:45 to 7:00	1	0	**1**	2	0	**2**	8	0	**8**	0	0	**0**	**11**
7:00 to 7:15	2	0	**2**	0	0	**0**	9	0	**9**	1	0	**1**	**12**
7:15 to 7:30	0	0	**0**	0	0	**0**	5	0	**5**	1	0	**1**	**6**
7:30 to 7:45	1	0	**1**	0	0	**0**	7	0	**7**	0	0	**0**	**8**
7:45 to 8:00	2	0	**2**	2	0	**2**	14	0	**14**	1	0	**1**	**19**
8:00 to 8:15	1	0	**1**	0	0	**0**	9	0	**9**	0	0	**0**	**10**
8:15 to 8:30	1	0	**1**	0	0	**0**	6	0	**6**	0	0	**0**	**7**
8:30 to 8:45	1	0	**1**	0	0	**0**	4	0	**4**	0	0	**0**	**5**
8:45 to 9:00	1	0	**1**	1	0	**1**	7	0	**7**	1	0	**1**	**10**
AM Totals	**12**	**0**	**12**	**5**	**0**	**5**	**78**	**0**	**78**	**6**	**0**	**6**	**101**
15:00 to 15:15	1	0	**1**	1	0	**1**	2	0	**2**	0	0	**0**	**4**
15:15 to 15:30	1	0	**1**	2	0	**2**	2	0	**2**	2	0	**2**	**7**
15:30 to 15:45	0	0	**0**	1	0	**1**	5	0	**5**	0	0	**0**	**6**
15:45 to 16:00	2	0	**2**	4	0	**4**	5	0	**5**	1	0	**1**	**12**
16:00 to 16:15	3	0	**3**	1	0	**1**	3	0	**3**	0	0	**0**	**7**
16:15 to 16:30	8	0	**8**	4	0	**4**	1	0	**1**	0	0	**0**	**13**
16:30 to 16:45	4	0	**4**	2	0	**2**	7	0	**7**	0	0	**0**	**13**
16:45 to 17:00	1	0	**1**	1	0	**1**	1	0	**1**	1	0	**1**	**4**
17:00 to 17:15	3	0	**3**	2	0	**2**	2	0	**2**	1	0	**1**	**8**
17:15 to 17:30	11	0	**11**	1	0	**1**	5	0	**5**	2	0	**2**	**19**
17:30 to 17:45	9	0	**9**	3	0	**3**	3	0	**3**	1	0	**1**	**16**
17:45 to 18:00	2	0	**2**	1	0	**1**	6	0	**6**	1	0	**1**	**10**
18:00 to 18:15	11	0	**11**	2	0	**2**	1	0	**1**	0	0	**0**	**14**
18:15 to 18:30	6	0	**6**	0	0	**0**	1	0	**1**	0	0	**0**	**7**
18:30 to 18:45	9	0	**9**	1	0	**1**	4	0	**4**	0	0	**0**	**14**
18:45 to 19:00	7	0	**7**	1	0	**1**	3	0	**3**	1	0	**1**	**12**
PM Totals	**78**	**0**	**78**	**27**	**0**	**27**	**51**	**0**	**51**	**10**	**0**	**10**	**166**

[Hourly Summary]

	IN		OUT		
	Direction 1	Direction 3	Direction 2	Direction 4	

Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Grand Total
6:00 to 7:00	3	0	**3**	2	0	**2**	17	0	**17**	2	0	**2**	**24**
6:15 to 7:15	5	0	**5**	2	0	**2**	23	0	**23**	2	0	**2**	**32**
6:30 to 7:30	4	0	**4**	2	0	**2**	26	0	**26**	3	0	**3**	**35**
6:45 to 7:45	4	0	**4**	2	0	**2**	29	0	**29**	2	0	**2**	**37**
7:00 to 8:00	5	0	**5**	2	0	**2**	35	0	**35**	3	0	**3**	**45**
7:15 to 8:15	4	0	**4**	2	0	**2**	35	0	**35**	2	0	**2**	**43**
7:30 to 8:30	5	0	**5**	2	0	**2**	36	0	**36**	1	0	**1**	**44**
7:45 to 8:45	5	0	**5**	2	0	**2**	33	0	**33**	1	0	**1**	**41**
8:00 to 9:00	4	0	**4**	1	0	**1**	26	0	**26**	1	0	**1**	**32**
AM Totals	**12**	**0**	**12**	**5**	**0**	**5**	**78**	**0**	**78**	**6**	**0**	**6**	**101**
15:00 to 16:00	4	0	**4**	8	0	**8**	14	0	**14**	3	0	**3**	**29**
15:15 to 16:15	6	0	**6**	8	0	**8**	15	0	**15**	3	0	**3**	**32**
15:30 to 16:30	13	0	**13**	10	0	**10**	14	0	**14**	1	0	**1**	**38**
15:45 to 16:45	17	0	**17**	11	0	**11**	16	0	**16**	1	0	**1**	**45**
16:00 to 17:00	16	0	**16**	8	0	**8**	12	0	**12**	1	0	**1**	**37**
16:15 to 17:15	16	0	**16**	9	0	**9**	11	0	**11**	2	0	**2**	**38**
16:30 to 17:30	19	0	**19**	6	0	**6**	15	0	**15**	4	0	**4**	**44**
16:45 to 17:45	24	0	**24**	7	0	**7**	11	0	**11**	5	0	**5**	**47**
17:00 to 18:00	25	0	**25**	7	0	**7**	16	0	**16**	5	0	**5**	**53**
17:15 to 18:15	33	0	**33**	7	0	**7**	15	0	**15**	4	0	**4**	**59**
17:30 to 18:30	28	0	**28**	6	0	**6**	11	0	**11**	2	0	**2**	**47**
17:45 to 18:45	28	0	**28**	4	0	**4**	12	0	**12**	1	0	**1**	**45**
18:00 to 19:00	33	0	**33**	4	0	**4**	9	0	**9**	1	0	**1**	**47**
PM Totals	**78**	**0**	**78**	**27**	**0**	**27**	**51**	**0**	**51**	**10**	**0**	**10**	**166**

[Peak Hour Summary]

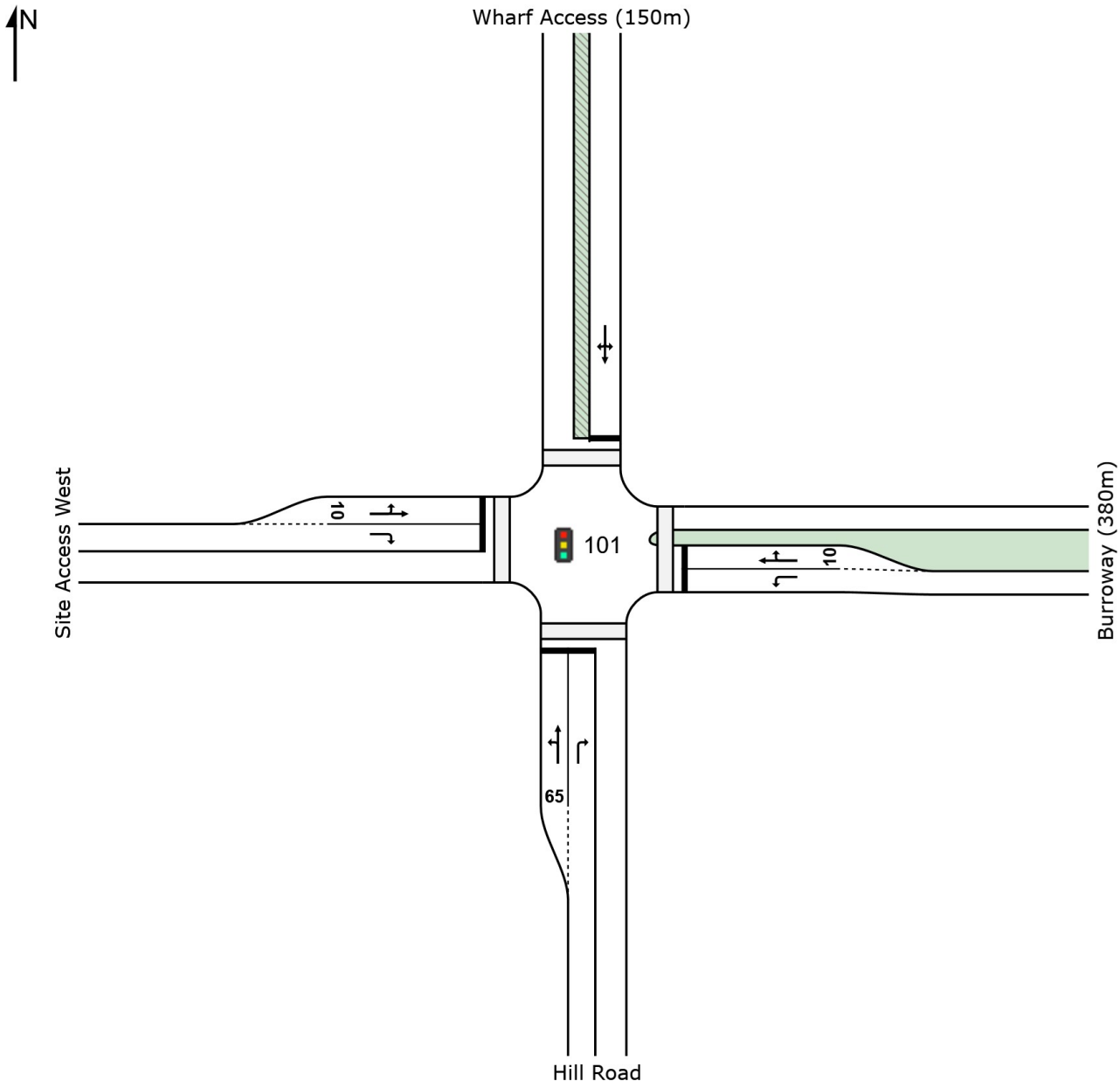
		IN						OUT						Grand Total
		Direction 1			Direction 3			Direction 2			Direction 4			
	Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM	7:00 to 8:00	5	0	**5**	2	0	**2**	35	0	**35**	3	0	**3**	**45**
PM	17:15 to 18:15	33	0	**33**	7	0	**7**	15	0	**15**	4	0	**4**	**59**

Appendix B

SITE LAYOUT

Site: 101 [Hill Rd_Burroway Rd + Dev 1720 + SOPA AM]

Hill Road_Burroway Road
2023 Base + Development 1720 +SOPA
AM Peak
Signals - Fixed Time Isolated



LANE SUMMARY

Site: 101 [Hill Rd_Burroway Rd + Dev 1720 + SOPA AM]

Hill Road_Burroway Road
2023 Base + Development 1720 +SOPA
AM Peak
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Hill Road													
Lane 1	142	9.6	571	0.249	100	19.9	LOS B	3.2	23.9	Short	65	0.0	NA
Lane 2	280	4.5	435	0.644	100	26.6	LOS B	7.6	55.1	Full	500	0.0	0.0
Approach	422	6.2		0.644		24.4	LOS B	7.6	55.1				
East: Burroway (380m)													
Lane 1	337	6.9	812[1]	0.415	100	16.4	LOS B	6.4	47.4	Full	380	0.0	0.0
Lane 2	13	83.3	532	0.024	100	14.8	LOS B	0.2	2.3	Short	10	0.0	NA
Approach	349	9.7		0.415		16.4	LOS B	6.4	47.4				
North: Wharf Access (150m)													
Lane 1	73	2.9	620	0.117	100	16.0	LOS B	1.5	11.0	Full	150	0.0	0.0
Approach	73	2.9		0.117		16.0	LOS B	1.5	11.0				
West: Site Access West													
Lane 1	2	0.0	929	0.002	100	11.2	LOS A	0.0	0.2	Short	10	0.0	NA
Lane 2	289	0.7	429[1]	0.675	100	24.9	LOS B	7.8	55.0	Full	500	0.0	0.0
Approach	292	0.7		0.675		24.8	LOS B	7.8	55.0				
Intersection	1136	5.7		0.675		21.5	LOS B	7.8	55.1				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 101 [Hill Rd_Burroway Rd + Dev 1720 + SOPA PM]

Hill Road_Burroway Road
2023 Base + Development 1720 +SOPA
PM Peak
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Hill Road													
Lane 1	385	9.4	873	0.441	100	14.3	LOS A	7.5	56.7	Short	65	0.0	NA
Lane 2	352	4.5	616	0.570	100	18.5	LOS B	7.7	56.0	Full	500	0.0	0.0
Approach	737	7.1		0.570		16.3	LOS B	7.7	56.7				
East: Burroway (380m)													
Lane 1	297	6.9	529[1]	0.561	100	24.4	LOS B	7.4	54.8	Full	380	0.0	0.0
Lane 2	13	83.3	367	0.034	100	21.6	LOS B	0.3	3.1	Short	10	0.0	NA
Approach	309	10.0		0.561		24.3	LOS B	7.4	54.8				
North: Wharf Access (150m)													
Lane 1	116	2.9	944	0.123	100	9.3	LOS A	1.9	13.4	Full	150	0.0	0.0
Approach	116	2.9		0.123		9.3	LOS A	1.9	13.4				
West: Site Access West													
Lane 1	2	0.0	609	0.003	100	17.7	LOS B	0.0	0.3	Short	10	0.0	NA
Lane 2	69	0.7	259	0.268	100	29.6	LOS C	1.9	13.1	Full	500	0.0	0.0
Approach	72	0.7		0.268		29.2	LOS C	1.9	13.1				
Intersection	1234	7.1		0.570		18.4	LOS B	7.7	56.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 101 [[Current TIA Sensitivy] Hill Rd_Burroway Rd AM]

Hill Road_Burroway Road
2023 Base + Development 2736+SOPA
AM Peak
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Hill Road													
Lane 1	177	8.0	454	0.390	100	24.5	LOS B	4.5	33.3	Short	65	0.0	NA
Lane 2	280	4.5	347	0.806	100	35.1	LOS C	9.2	66.7	Full	500	0.0	0.0
Approach	457	5.9		0.806		31.0	LOS C	9.2	66.7				
East: Burroway (380m)													
Lane 1	337	6.9	925[1]	0.364	100	13.8	LOS A	5.5	41.1	Full	380	0.0	0.0
Lane 2	14	76.9	616	0.022	100	12.2	LOS A	0.2	2.1	Short	10	0.0	NA
Approach	351	9.6		0.364		13.7	LOS A	5.5	41.1				
North: Wharf Access (150m)													
Lane 1	73	2.9	488	0.149	100	19.5	LOS B	1.7	12.2	Full	150	0.0	0.0
Approach	73	2.9		0.149		19.5	LOS B	1.7	12.2				
West: Site Access West													
Lane 1	2	0.0	1057	0.002	100	9.1	LOS A	0.0	0.2	Short	10	0.0	NA
Lane 2	428	0.7	508[1]	0.843	100	32.0	LOS C	14.7	103.7	Full	500	0.0	0.0
Approach	431	0.7		0.843		31.9	LOS C	14.7	103.7				
Intersection	1311	5.0		0.843		26.0	LOS B	14.7	103.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 101 [[Current TIA Sensitivy] Hill Rd_Burroway Rd PM]

Hill Road_Burroway Road
2023 Base + Development 2736+SOPA
PM Peak
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: Hill Road													
Lane 1	676	5.9	975	0.693	100	15.5	LOS B	14.8	109.1	Short	65	0.0	NA
Lane 2	352	4.5	680	0.517	100	16.1	LOS B	7.0	50.6	Full	500	0.0	0.0
Approach	1027	5.4		0.693		15.7	LOS B	14.8	109.1				
East: Burroway (380m)													
Lane 1	297	6.9	445[1]	0.667	100	28.1	LOS B	8.2	60.8	Full	380	0.0	0.0
Lane 2	13	83.3	317	0.040	100	24.1	LOS B	0.3	3.4	Short	10	0.0	NA
Approach	309	10.0		0.667		28.0	LOS B	8.2	60.8				
North: Wharf Access (150m)													
Lane 1	116	2.9	1025	0.113	100	7.6	LOS A	1.7	12.0	Full	150	0.0	0.0
Approach	116	2.9		0.113		7.6	LOS A	1.7	12.0				
West: Site Access West													
Lane 1	2	0.0	513	0.004	100	20.0	LOS B	0.0	0.3	Short	10	0.0	NA
Lane 2	141	0.7	198[1]	0.714	100	36.9	LOS C	4.5	31.6	Full	500	0.0	0.0
Approach	143	0.7		0.714		36.7	LOS C	4.5	31.6				
Intersection	1596	5.7		0.714		19.4	LOS B	14.8	109.1				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.